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FOUR NEW SPECIES OF *ERIGERON* (COMPOSITAE: ASTEREAE) FROM NORTHERN MÉXICO

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ABSTRACT

Three species of *Erigeron* endemic to the Sierra Madre or immediately adjacent areas of Coahuila, Nuevo Leon and Tamaulipas of northeastern México are proposed as new: **E. scoparioides**, an anomalous species at least superficially similar to *E. filifolius* (Hook.) Nutt. of the western United States; **E. hintoniorum**, most closely related to *E. palmeri* A. Gray, a species of relatively lower elevations ranging from Oaxaca to Nuevo Leon; and **E. onofrensis**, a narrowly endemic, epappose vicariad of *E. flagellaris* A. Gray, which is widespread in the western United States and northern México. A fourth proposed new species, **E. mohinorensis** from Cerro Mohinora in southern Chihuahua, is closely related to *E. galeottii* (A. Gray ex Hemsl.) E. Greene, which occurs primarily in the trans-volcanic mountains from Veracruz to Michoacán.

KEY WORDS: *Erigeron*, Asteraceae, México, systematics.

Four new species of *Erigeron* from northern México are described below.

Erigeron scoparioides Nesom, sp. nov. TYPE: MÉXICO. Tamaulipas: Mpio. Bustamante, ca 1 mi NW of Hwy 101 on road toward Bustamante, 23° 18'N, 99° 40'W; area of pine-juniper with many evergreen shrubs, 1680 m, 2 Aug 1983, *G. Nesom 4785* (holotype: TEX!; isotypes: ANSM!,CAS!,GH!,MEXU!,MICH!,NY!,US).

Erigeron filifolio (Hook.) Nutt. similis foliis filiformibus ascendentibus et gemmis strictis sed habitu rhizomatoso, caulibus nitidis glabratis vel sparsim strigosis, capituliis minoribus, corollis radii non-circinatis, et pappo uniseriato differt.

Herbaceous perennials from very slender, woody rhizomes. Stems and leaves glabrate to very sparsely strigose with appressed hairs 0.2-0.6 mm long, eglandular, shiny-textured. Stems strictly erect, 12-25 cm tall, few-branched

above the very base. Basal leaves absent, the cauline densely arranged, stiffly ascending, filiform, 0.3-0.5 mm wide, mostly 8-22 mm long, little or not at all reduced in size upwards, with apex often falcate-apiculate. Heads solitary, campanulate, 6-7 mm wide (pressed), on peduncles 5-15 mm long, erect in bud; phyllaries glabrate, often with a few, minute glandular hairs, greenish with a golden-brown midvein, white lateral zones, and margins with a narrow, scarious rim, elliptic-lanceolate, 4.0-5.1 mm long, in 3-4 series, the outermost 1/3-1/2 as long as the inner. Ray flowers 16-29 in a single series, corollas white, drying white to light pink, without a midstripe, 4.5-5.0 mm long, including the tube 1.0-1.4 mm long, the ligules 0.6-1.0 mm wide, 3-4 veined, not coiling or reflexing. Disc corollas tubular-funnelform, 3.0-3.5 mm long, not indurated or inflated; style branches 0.5-0.6 mm long, including the deltate to shallowly to very shallowly triangular collecting appendages 0.1-0.2 mm long. Achenes oblong to narrowly oblong, ca 1 mm long, sparsely strigose; pappus of 17-22 persistent bristles 2.0-3.5 mm long, without an outer series.

Known only from the cited collections, which were made within a few kilometers of one another on the deeply dissected limestone plateau east of Bustamante, Tamaulipas; moist ravines, shaded by shrubs, area of pine-juniper to chaparral with *Dodonaea, Aloysia, Leucophyllum, Hechtia, Acacia;* 1650-1700 m; flowering Jun-Aug.

Additional collection examined: MÉXICO. Tamaulipas: Mpio. Bustamante, 4.8 mi NW of Hwy 101 on road toward Bustamante, 23° 25'N, 99° 40'W; small ravine at bottom of larger canyon, steep, W-facing slope overlooking deep valley, chaparral, 15 Jun 1987, *G. Nesom 5978 et al.* (CAS, CHAPA,ENCB,F,MEXU,MICH,MO,NY,RM,TEX,UAT).

Erigeron scoparioides can be immediately recognized by its thin, strictly erect stems, stiffly ascending, filiform leaves that are relatively even in size and unreduced from stem bottom to top, small heads with white, straight, ray corollas, and simple pappus. The stems and leaves are glabrate to very sparsely short-strigose and have a shiny-textured surface. The plants form dense masses interconnected through the system of slender rhizomes.

Because it is so strikingly different in morphology, the relationships of *Erigeron scoparioides* are difficult to discern. It is at least superficially similar to *Erigeron filifolius* (Hook.) Nutt. of the western United States, but that species is tap-rooted, not rhizomatous, and has a biseriate pappus and larger heads with coiling ligules with a strong tendency to produce blue pigments. If *Erigeron scoparioides* is related to species of México, the strictly erect buds, unusual among species of eastern México, suggest that its affinities may lie with the group that includes *E. karvinskianus* DC.

Erigeron hintoniorum Nesom, sp. nov. TYPE: MÉXICO. Coahuila: Mpio. Arteaga, Sierra Coahuilon, pine forest at 3300 m, 23 Jun 1985,

Hinton et al. 18868 (holotype: TEX!).

Erigeron palmero A. Gray similis sed indumento villoso, phyllariis glandulosis, et setarum pappi numero majori differt.

Perennials from short (1-3 cm long) rhizomes. Stems monocephalous, erect or usually somewhat basally ascending, 11-28 cm tall, the earliest on shorter stems 8-10 cm tall, shallowly ribbed, moderately villous, the hairs with a noticeable retrorse orientation, especially on the lower part of the stem. Leaves moderately to sparsely villous to long-strigose, often less densely so beneath; basal leaves 4-10 cm long, the blades elliptic to obovate, 6-18 mm wide, basally attenuate to a petiole equal the length of the blade, wide, hyaline and sometimes purple at the very base, margins remotely serrate with 2-5 pairs of teeth, sinuations, or shallow lobes, sometimes merely mucronulate and nearly entire, the apex mostly rounded to obtuse; cauline leaves sharply reduced in size on the lower third of the stem, very scattered above that and further reduced to lanceolate or linear-lanceolate bracts. Heads solitary, hemispheric, 13-18 mm wide (pressed), the involucre and immediately subtending peduncle densely white-villous; phyllaries linear-lanceolate to lanceolate, 7-11 mm long, in 3-5 series of equal length, usually dark purple, the apices long-attenuate, loose and with glandular to stipitate-glandular hairs in addition to the villous vestiture. Ray flowers 80-130 in 1-2 series, the corollas 13-18 mm long, the tube 2-3 mm long, sparsely pubescent with biseriate hairs, the ligules 3-4(-5) veined, 0.9-2.2 mm wide, pink to white, drying white to dark purple, without a midstripe, sometimes coiling at the tip. Disc corollas tubular-funnelform, 3.2-4.2 mm long, with erect, deltate lobes, not inflated or indurated, the tube 0.8-1.0 mm long; style branches 0.9-1.1 mm long, including the triangular to triangular-ovate collecting appendages 0.1-0.2 mm long. Achenes narrowly oblong, compressed with 2, orange nerves, mature size not observed but probably 2.5-3.0 mm long, sparsely strigose; pappus bristles ca 25-45, about the same height as the corolla, in 1 series or with a few, inconspicuous, outer setae 0.1-0.3 mm high.

Known from Nuevo Leon (Cerro Potosí) and Coahuila (Sierra Coahuilon and Sierra La Marta); open pine forests in alpine or subalpine zones, with or near *P. culminicola* or *P. hartwegii;* 3250-3700 m; flowering June-July.

Additional collections examined: MÉXICO. Coahuila: Mpio. Arteaga, Sierra del Coahuilon, 8 Sep 1985, *Hinton et al. 18907* (TEX); Mpio. Arteaga, S side of Sierra Coahuilon, 18 Jun 1985, *McDonald 1505* (TEX); Mpio. Arteaga, Sierra La Marta, S side of Cerro del Morro at the top, 17 Jun 1985, *McDonald 1458* (TEX). Nuevo Leon: Mpio. Galeana, summit of Cerro Potosí, 26 Jul 1985, *McDonald 1800* (TEX).

This is the only woolly-headed *Erigeron* known from México. It is closely related to *E. palmeri,* which occurs from Oaxaca to Nuevo Leon at elevations of 1650 to 2850 meters. *Erigeron palmeri* is common in the area of

Peña Nevada, Nuevo Leon, but grows no further north; the two species are allopatric. *Erigeron hintoniorum* and *E. palmeri* are similar in their monocephalous stems with retrorsely oriented pubescence, thickish and elliptic to obovate leaves with long petioles, white ray flowers with coiling ligules and achenes with orange ribs. The new species differs most prominently from the latter in its woolly involucre and upper stems, hairy leaves, glandular phyllaries and greater number of pappus bristles.

Erigeron onofrensis Nesom, sp. nov. TYPE: MÉXICO. Nuevo Leon: Mpio. Doctor Arroyo, N of Cerro Peña Nevada on peak known locally as Picacho Onofre, open meadows with *Pinus hartwegii,* 2850 m, 27 Jul 1977, *G. Nesom R582* with C. Wells – voucher for a chromosome count of $n = 9$ pairs (holotype: US!; isotypes: ARIZ!,ASU!,ENCB!,GH!, MEXU!,NCU!,OS!,SMU!,TEX!).

Erigeron flagellari A. Gray arcte affinis et forsan oriundus sed foliis semper integris, phyllariis herbaceis ad bases, et pappo sine setis differt.

Annual or short-lived perennial herbs from shallow fibrous roots, a taproot, or several, slender, woody axes, producing prostrate, herbaceous, leafy stoloniferous branches up to 32 cm long, these bearing rooting plantlets at their tips. Erect stems unbranched, monocephalous, 4-16 cm tall, sparsely strigose. Leaves sparsely to moderately pubescent with appressed to ascending hairs, sparsely long-ciliate along the petiole margins; basal leaves 5-50 mm long, the blade obovate to spatulate, 2-7 mm wide, basally attenuate to a petiole about 1/3-1/2 as long as the leaf, the margins entire, the apex rounded, sometimes mucronulate; cauline leaves 4-10 on erect stems, sessile, epetiolate, sharply reduced in size on the upper 1/2-1/3 of the stem, even-sized and regularly spaced on the stoloniferous branches. Heads solitary, hemispheric, 8-11 mm wide (pressed); phyllaries elliptic to lanceolate, in 3-4 equal to subequal series, the inner 4-8 mm long, the outer 2/3-3/4 as long, sparsely to moderately pubescent with spreading to loosely appressed hairs, densely and minutely punctate-glandular. Ray flowers 40-80 in 1-2 series, the corollas white to light lavender or with a lavender midstripe below, drying the same, 3-4 veined, 6-10 mm long, the tube 0.9-1.6 mm long, sparsely pubescent with glandular-biseriate and non-glandular hairs, the ligule 0.7-1.2 mm wide. Disc corollas narrowly funnelform, 2.0-2.5 mm long, the lower 1/4 constricted, slightly indurated just above the constriction; style branches 0.4-0.6 mm long, including the shallowly to very shallowly triangular collecting appendages 0.1 mm long. Achenes compressed, oblong-obovate, 1.0-1.4 mm long, tan with two, thin, orange ribs, sparsely strigose; pappus of ray and disc a low, fimbriate crown or series of laciniate scales sometimes basally fused to form a crown, ca 0.1-0.2 mm high. Chromosome number, $n = 9$ pairs.

Known only from the area of Cerro Peña Nevada on the border between Nuevo Leon and Tamaulipas; with pines in upper subalpine to alpine meadows, where the plants of this species form almost continuous mats over large areas, also in clearings among aspens and firs, or less commonly oaks, at lower elevations in deep arroyos; 2800-3600 m; flowering Jun-Sep(-Oct).

Additional collections examined: MÉXICO. Nuevo Leon: Mpio. Doctor Arroyo, [at or near type locality]: 4 Jul 1959, *Beaman 2697* (DUKE,ENCB, GH,TEX,UC,US); 5 Jul 1985, *McDonald 1648* (TEX-2 sheets); 25 Jun 1978, *Rzedowski 17390* (TEX); Mpio. Zaragoza, near Rancho La Encantada [ca 5 km NE of Peña Nevada], 4 Jul 1988, *Patterson 5840* (TEX). Tamaulipas: Mpio. Miquihuana, E and S slopes of Peña Nevada, 19 Jul 1949, *Stanford et al., 2598* (GH,MICH,MO,NY,SMU,UC).

Cytological material of *Erigeron onofrensis* was collected by Beaman in 1959 and a count of $n = 8$ was published for it (Turner et al. 1961). The plants were identified in that publication as *Astranthium xanthocomoides* (Less.) Larsen, but DeJong & Longpre (1963) later referred them to *Achaetogeron* and suggested that a recount was in order, since the base number for *Achaetogeron* was known to be $n = 9$. The count noted above for the type collection showed nine bivalents with no irregularities at late prophase and metaphase of the first meiotic division.

Erigeron onofrensis appears to be an epappose vicariad and occurs on the southeastern-most edge of the range of *E. flagellaris* A. Gray, a widespread species of the western cordillera that occurs from British Columbia to Arizona and New Mexico and south to central México and east to northeastern México. The latter is known in the eastern Sierra Madre as far south as Cerro Potosí, Nuevo Leon. Both species produce mostly monocephalous, erect stems and herbaceous stolons that root at the tips and are similar in most other characters as well. *Erigeron onofrensis*, however, completely lacks pappus bristles, although an outer series of pappus scales is present. It also has rays in 2-3 series (vs 1-2), strictly entire leaves (vs entire to lobed), stem pubescence variably appressed to spreading (vs appressed) and phyllaries herbaceous from base to apex (vs basally indurated). The stoloniferous habit has been evolved independently in other species of *Erigeron (E. guatemalensis* (Blake) Nesom, *E. forreri* E. Greene, *E. fundus* Nesom), but the morphological similarities between *E. onofrensis* and *E. flagellaris* strongly argue that they are sister taxa. Further, a preliminary chromatographic study of leaf compounds showed that they have almost identical spot profiles of compounds assumed to be flavonoids or simple phenolics (Nesom, unpublished).

Erigeron mohinorensis Nesom, sp. nov. TYPE: MÉXICO. Chihuahua: Mpio. Guadalupe y Calvo, N side of Cerro Mohinora, ca 13 mi SW of Guadalupe y Calvo, 25° 57'N, 107° 03'W; open, pine-fir woods with scattered spruce, barely into flower, 20 Aug 1988, *G. Nesom 6448* with

A. McDonald (holotype: TEX!; isotypes: ARIZ!,MEXU!,NY!,US!).

Erigeron galeottii (A. Gray ex Hemsley) E. Greene similis et arcte affinis sed foliis basalibus spathulatis marginibus integris, foliis caulinorum amplectentibus basaliter ampliatus, phyllariis sine cristis basalibus, et flosculis radii 110-175(-230) vs 35-80 (-115) differt.

Herbaceous perennials from fibrous roots, producing short offsets or rhizomes 1-3 cm long. Stems basally ascending, 9-15(-30) cm tall, simple or with a single branch on the upper half, moderately hispid-pilose, the hairs sometimes deflexed, eglandular. Leaves strigose-pilose, the basal [usually] persistent in a rosette, spatulate, 15-50 mm long, the blades obovate to widely obovate, 6-19 mm wide, basally attenuate to a petiole 1/3(-1/2) the leaf length, margins entire or very rarely with one or a pair of distal teeth; cauline leaves oblong to oblong-lanceolate, clasping, often basally ampliate, 10-31 mm long, relatively even-sized upwards. Heads solitary on peduncles 1-5 cm long, hemispheric, 10-13 mm wide (pressed), the buds erect; phyllaries linear-lanceolate, 5.0-6.5 mm long, in 3-4 series of nearly equal length or the outer usually the longest, hispid-pilose, minutely glandular at least on the distal third, greenish with purple tips, the outer mostly without scarious margins. Ray flowers 110-175(-230) in 2-3 series, corollas white, drying white, 10-13 mm long, including the tube 1.0-1.5 mm long, the ligules 0.7-1.0 mm wide, 3-4(-5) veined, the apices coiling at maturity, the tube pubescent with jointed, uniseriate hairs and bulbous-tipped, biseriate hairs. Disc corollas tubular-funnelform, 2.0-2.4 mm long, not indurated or inflated; style branches 0.6-0.7 mm long, including the deltate to triangular collecting appendages 0.1-0.2 mm long. Achenes oblong, mature size not observed, sparsely strigose, compressed, 2-nerved; pappus a crown of separate, linear-lanceolate scales 0.1 mm high, without bristles.

Endemic to the summit and immediately surrounding area of Cerro Mohinora of southern Chihuahua; abundant in open, pine-fir woods with scattered spruce; 2900-3100 m; flowering August-November.

Additional collections examined: MÉXICO. Chihuahua: [Type locality]: 16-17 Oct 1959, *Correll & Gentry 23151* (LL); 27 Aug 1987, *McDonald & Martínez 2371* (TEX).

Erigeron mohinorensis is closely related to *Erigeron galeottii* (A. Gray ex Hemsley) E. Greene, the common, high-elevation, white-rayed *Erigeron* of the trans-volcanic ranges from Veracruz to Michoacán. A disjunct population system of *E. galeottii* occurs in the Sierra de Oaxaca and another, noted below, in northwestern Chihuahua. Both species are members of a group of species characterized by erect buds, white, coiling ray corollas and achenes without pappus bristles or, if present, the bristles are very short and appear sporadically in few individuals. *Erigeron mohinorensis* and *E. galeottii*

are distinguished from related species by their perennial, somewhat cespitose habit with short basal offsets or rhizomes, herbaceous phyllaries with purple tips and hispid-pilose vestiture, and coroniform pappus of basally fused, minute setae or scales 0.1 mm high.

In an earlier study (Nesom 1980), I included the Mohinora plants (based on the single Correll & Gentry sheet cited above) with *E. galeottii,* but with more collections available and after a chance to observe them in the field, I believe they should be separated as in the following couplet.

1. Basal leaves spatulate, the blades widely ovate to obovate, the petiole 1/3(-1/2) the leaf length, margins entire or very rarely with one or a pair of teeth distally; cauline leaves oblong, often basally ampliate, clasping; phyllaries without basal ridges; ray flowers 110-175(-230) ..... *E. mohinorensis*

1. Basal leaves with elliptic-lanceolate to -oblanceolate blades, the petiole 1/3-2/3 the leaf length, margins serrate with 2-8(-11) pairs of teeth or prominent mucros; cauline leaves lanceolate to oblanceolate, not basally ampliate or clasping; phyllaries with a pair of whitish, longitudinal ridges on the lower third; ray flowers 35-80(-115) ..... *E. galeottii*

Three collections from northwestern Chihuahua, separated from the closest population of the same species in Michoacán by more than 1300 km, appear to be typical *Erigeron galeottii:* Chuhuichupa, Aug-Sep 1936, *LeSueur 967* (GH,LL,MO,TEX,UC); near Colonia Garcia, 1-20 Aug 1899, *Nelson 6170* (GH,US); near Colonia Garcia, 29 Jul 1899, *Townsend & Barber 188* (GH,MEXU,MO,NMC,NY-2 sheets,TEX,UC,US). The few plants of these relatively old collections, however, are without basal leaves and appear to be single-stemmed from long, solitary rhizomes. They may represent a different taxon, but more observations are needed before they can be properly evaluated.

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